Warehouse Management in Microsoft Dynamics NAV 2013

Technical White Paper

Microsoft Dynamics ERP

WAREHOUSE MANAGEMENT

This documentation gives an overview of the concepts and principles that are used in the Warehouse Management features in Microsoft Dynamics NAV 2013. It explains the design behind central warehouse features and how warehousing integrates with other supply chain features.

To differentiate the different complexity levels of the warehousing, this documentation is divided into two general groups, Basic and Advanced Warehousing, indicated by section titles. This simple differentiation covers different complexity levels as defined by product granules and location setup. For more information, see Warehouse Setup.

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Warehouse Overview

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WAREHOUSE OVERVIEW

To support the physical handling of items on the zone and bin level, all information must be traced for each transaction or movement in the warehouse. This is managed in the **Warehouse Entry** table. Each transaction is stored in a warehouse register.

Warehouse documents and a warehouse journal are used to register item movements in the warehouse. Every time that an item in the warehouse is moved, received, put away, picked, shipped, or adjusted, warehouse entries are registered to store the physical information about zone, bin, and quantity. For more information, see Inbound Warehouse Flow, Internal Warehouse Flows, and Outbound Warehouse Flow.

The **Bin Content** table is used to handle all the different dimensions of the contents of a bin per item, such as unit of measure, maximum quantity, and minimum quantity. The **Bin Content** table also contains flow fields to the warehouse entries, warehouse instructions, and warehouse journal lines, which ensures that the availability of an item per bin and a bin for an item can be calculated quickly. For more information, see Availability in the Warehouse.

When item postings occur outside the warehouse module, a default adjustment bin per location is used to synchronize warehouse entries with inventory entries. During physical inventory of the warehouse, any differences between the calculated and counted quantities are recorded in the adjustment bin and then posted as correcting item ledger entries. For more information, see Integration with Inventory.

The following illustration outlines typical warehouse flows.
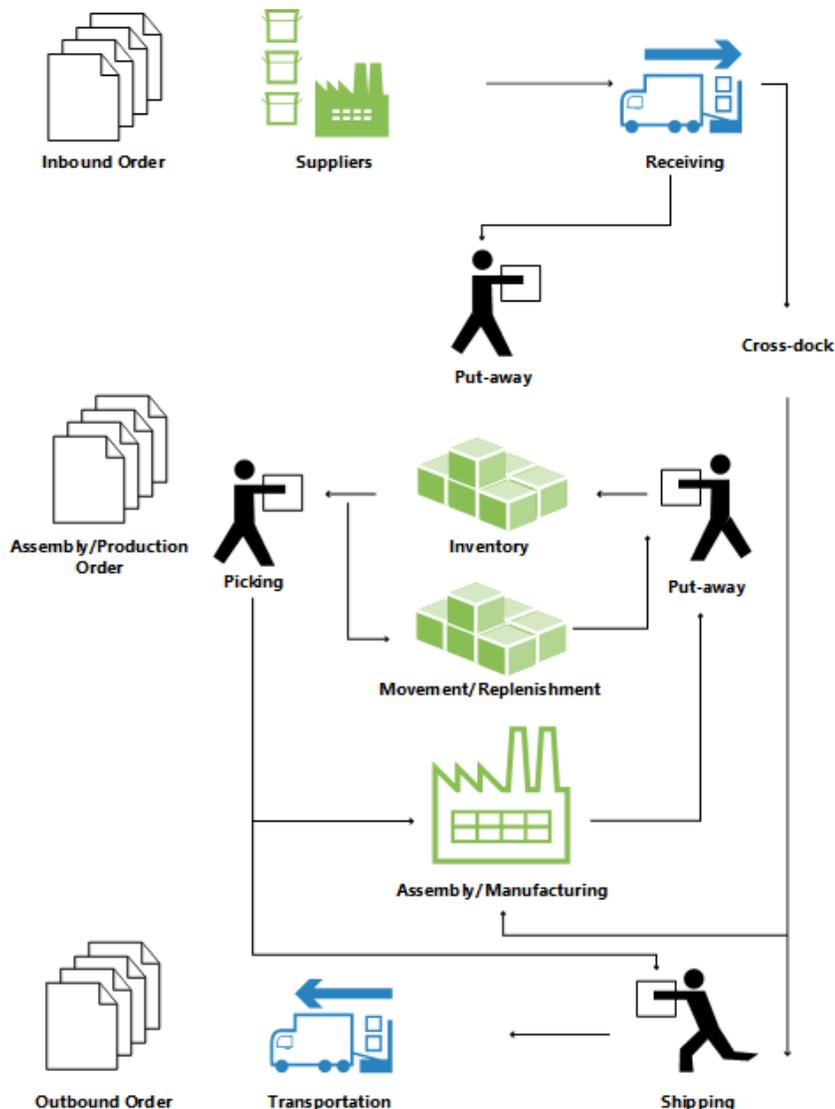
BASIC OR ADVANCED WAREHOUSING

Warehouse functionality in Microsoft Dynamics NAV can be implemented in different complexity levels, depending on a company's processes and order volume. The main difference is that activities are performed order-by-order in basic warehousing when they are consolidated for multiple orders in advanced warehousing.

To differentiate between the different complexity levels, this documentation refers to two general denominations, Basic and Advanced Warehousing. This simple differentiation covers several different complexity levels as defined by product granules and location setup, each supported by different UI documents. For more information, see Warehouse Setup.

📝 **Note** The most advanced level of warehousing is referred to as "WMS installations" in this documentation, since this level requires the most advanced granule, Warehouse Management Systems.

The following different UI documents are used in basic and advanced warehousing.

BASIC UI DOCUMENTS

- **Inventory Put-away**
- **Inventory Pick**
- **Inventory Movement**
- **Item Journal**
- **Item Reclassification Journal**
- (Various reports)

ADVANCED UI DOCUMENTS

- **Warehouse Receipt**
- **Put-away Worksheet**
- **Warehouse Put-away**
- **Pick Worksheet**
- **Warehouse Pick**
- **Movement Worksheet**
- **Warehouse Movement**
- **Internal Whse. Pick**
- **Internal Whse. Put-away**
- **Bin Creation Worksheet**
- **Bin Content Creation Worksheet**
- **Whse. Item Journal**
- **Whse. Item Reclass. Journal**
- (Various reports)

For more information about each document, see the respective window topics.

TERMINOLOGY

To align with the financial concepts of purchases and sales, Microsoft Dynamics NAV warehouse documentation refers to the following terms for item flow in the warehouse.

Term	Description
Inbound flow	Items moving into the warehouse location, such as purchases and inbound transfers.
Internal flow	Items moving inside the warehouse location, such as production components and output.
Outbound flow	Items moving out of the warehouse location, such as sales and outbound transfers.

SEE ALSO

Warehouse Management

WAREHOUSE SETUP

Warehouse functionality in Microsoft Dynamics NAV 2013 contains different levels of complexity, as defined by license permissions in the offered granules. The level of complexity in a warehouse solution is largely defined by the bin setup on location cards, which in turn is license-controlled so that access to bin setup fields is defined by the license. In addition, the application objects in the license govern which UI document to use for the supported warehouse activities.

The following warehouse-related granules exist:

- Basic Inventory (4010)
- Bin (4170)
- Put Away (4180)
- Warehouse Receipt (4190)
- Pick (4200)
- Warehouse Shipment (4210)
- Warehouse Management Systems (4620)
- Internal Picks and Put-aways (4630)
- Automated Data Capture System (4640)
- Bin Setup (4660)

For more information about each granule, see "Microsoft Dynamics NAV Price List Explanation" in Microsoft Dynamics NAV Price Sheets (requires PartnerSource account),

The following table shows which granules are required to define different warehouse complexity levels, which UI documents support each level, and which location codes reflect these levels in the CRONUS International Ltd. demonstration database.

Complexity level	Description	UI document	CRONUS location	Minimum granule requirement
1	No dedicated warehouse activity. Receive/ship posting from orders.	Order	BLUE	Basic Inventory
2	No dedicated warehouse activity. Receive/ship posting from orders. Bin code is required.	Order, with bin code	SILVER	Basic Inventory/Bin
3	Basic warehouse activity, order-by-order. Receive/ship posting from inventory put-away/pick documents. Bin code is required.	Inventory Put-away/Inventory Movement/Inventory Pick, with bin code	(SILVER + Require Put-away or Require Put-away)	Basic Inventory/Bin/Put Away/Pick
4	Advanced warehouse activity, for multiple orders. Consolidated receive/ship posting based on warehouse put-away/pick registrations.	Warehouse Receipt/Warehouse Put-away/Warehouse Pick/Warehouse Shipment/Pick Worksheet	GREEN	Basic Inventory/Warehouse Receipt/Put Away/Pick/Warehouse Shipment

Complexity level	Description	UI document	CRONUS location	Minimum granule requirement
5	Advanced warehouse activity, for multiple orders. Consolidated receive/ship posting based on warehouse put-away/pick registrations. Bin code is required.	Warehouse Receipt/Warehouse Put-away/Warehouse Pick/Warehouse Shipment/Pick Worksheet/Put-away Worksheet, with bin code	(GREEN + Bin Mandatory)	Basic Inventory/Bin/Warehouse Receipt/Put Away/Pick/Warehouse Shipment
6 **Note** This level is referred to as "WMS", since it requires the most advanced granule, Warehouse Management Systems.	Advanced warehouse activity, for multiple orders. Consolidated receive/ship posting based on warehouse put-away/pick registrations. Bin code is required. Zone/class code is optional. Warehouse workers directed by workflow. Bin replenishment planning. Bin ranking. Bin setup by capacity. Slotting. Hand-help device integration.	Warehouse Receipt/Warehouse Put-away/Warehouse Pick/Warehouse Shipment/Warehouse Movement/Pick Worksheet/Put-away Worksheet/Internal Whse. Pick/Internal Warehouse Put-away, with bin/class/zone code Various worksheets for bin management ADCS screens	WHITE	Basic Inventory/Bin/Put Away/Warehouse Receipt/Pick/Warehouse Shipment/Warehouse Management Systems/Internal Picks and Put-aways/Bin Setup/Automated Date Capture System/Bin Setup

For examples of how the UI documents are used per warehouse complexity level, see Inbound Warehouse Flow and Outbound Warehouse Flow.

BIN AND BIN CONTENT

A bin is a storage device designed to contain discrete parts. It is the smallest container unit in Microsoft Dynamics NAV. Item quantities in bins are referred to as bin content. A lookup from the **Item** field or **Bin Code** field on any warehouse-related document line displays the calculated availability of the item in the bin.

A bin content can be given a property of Fixed, Dedicated, or Default to define how the bin content can be used. Bins with none of these properties are referred to as floating bins.

A fixed bin holds items that are assigned to the bin code in question. The Fixed bin property ensures that even if the bin content is momentarily emptied, the bin content does not disappear, and the bin is therefore selected again as soon as it has been replenished.

A dedicated bin holds bin content that can only be picked for the dedicated resource, such as a machine center, that uses the bin in question. Other non-pick content, such as quantities outbound on a shipment posting, can still be consumed from a dedicated bin. Only bin content considered by the **Create Pick** algorithm is protected in a dedicated bin.

The Default bin property is used by the system to suggest bins for warehouse activities. At WMS locations, the Default bin property is not used. At locations where bins are required, the property is used in inbound flows to specify where to place items. In outbound flows, the property is used to specify where to take items from.

Note If the outbound items are placed in several bins, then items are first taken from the non-default bins, to empty that bin content, and then the remaining items are taken from the default bin.

There can only be one default bin per item per location.

BIN TYPE

In WMS installations, you can restrict the warehouse activities that are allowed for a bin by assigning a bin type to it. The following bin types exist:

Bin type	Description
RECEIVE	Items posted as received but not yet put away.
SHIP	Items picked for warehouse shipment lines but not yet posted as shipped.
PUT AWAY	Typically, items to be stored in large units of measure but that you do not want to access for picking purposes. Because these bins are not used for picking, either for production orders or shipments, your use of a Put Away type bin might be limited, but this bin type could be useful if you have purchased a large quantity of items. Bins of this type should always have a low bin-ranking, so that when received items are put away, other higher-ranking PUTPICK bins fixed to the item are put away first. If you are using this type of bin, you must regularly perform bin replenishment so that the items stored in these bins are also available in PUTPICK or PICK type bins.
PICK	Items to be used for picking only. The replenishment of these bins can only be made by movement, not by put-away.
PUTPICK	Items in bins that are suggested for both the put-away and pick functions. Bins of this type probably have different bin rankings. You can set up your bulk storage bins as this type of bin with low bin rankings compared to your ordinary pick bins or forward picking area bins.
QC	This bin is used for inventory adjustments if you specify this bin on the location card in the **Adjustment Bin Code** field. You can also set up bins of this type for defective items and items being inspected. You can move items to this type of bin if you want to make them inaccessible to the usual item flow. 📝 **Note** Unlike all other bin types, the **QC** bin type has none of the item handling check boxes selected by default. This indicates that any content you place in a QC bin is excluded from item flows.

For all bin types, except PICK, PUTPICK, and PUTAWAY, no other activity is allowed for the bin than what is defined by its bin type. For example, a bin of type **Receive** can only be used to receive items into or pick items from.

📝 **Note**
Only movement can be made to bins of type RECEIVE and QC. Similarly, only movements can be made from bins of type SHIP and QC.

BIN RANKING

In advanced warehousing, you can automate and optimize how items are collected in put-away and pick worksheets by ranking bins so that items are suggested taken or placed according to rank criteria to use warehouse space optimally.

Put-away processes are optimized according to bin ranking by suggesting higher-ranking bins before lower-ranking bins. Similarly, pick processes are optimized by first suggesting items from bin content with high bin ranking. Furthermore, bin replenishments are suggested from lower-ranking bins to higher-ranking bins.

Bin ranking together with bin content information are the basic properties that allow users to slot items in the warehouse.

BIN SETUP

In WMS installations, bins can be set up with capacity values, such as quantity, total cubage, and weight to control which and how items are stored in the bin.

On each item card, you can assign a unit of measure (UOM) for the item, such as pieces, pallets, liters, grams, or boxes. You can also have a base UOM for an item and specify larger UOMs that are based on it. For example, you can define a pallet to equal 16 pieces, the latter being the base UOM.

If you want to set a maximum quantity of a specific item to be stored in an individual bin and the item has more than one UOM, then you must set the maximum quantity for every UOM that exists on the item card. Accordingly, if an item has been set up to be handled in pieces and pallets, then the **Max. Qty.** field in the **Bin Content** window for that item must also be in pieces and pallets. Otherwise, the allowed quantity for that bin is not calculated correctly.

Before you set capacity restrictions for bin contents on a bin, you must first make sure that the UOM and dimensions of the item have been set up on the item card.

Note
It is only possible to operate with multiple UOMs in WMS installations. I all other configurations, bin contents can only be in the base UOM. In all transactions with a UOM higher than the item's base UOM, the quantity is converted to the base UOM.

ZONE

In advanced warehousing, bins can be grouped in zones to manage how the workflow of warehouse activities is directed.

A zone could be a receiving zone or a stocking zone, and each zone can consist of one or several bins.

Most properties assigned to a zone will by default be assigned to the bin that is created from that zone.

CLASS

In advanced warehousing, you can assign warehouse class codes to items, bins, and zones to control where different item classes are stored, such as frozen goods. You can divide a zone into several warehouse classes. For example, items in the receiving zone can be stored as frozen, hazardous, or other class.

When you work with warehouse classes and a default receiving/shipping bin, you must manually fill in the appropriate bins in the warehouse receipt and shipment lines.

In inbound flows, the class code is only highlighted on inbound lines where the item class code does not match the default receiving bin. If the correct default bins are not assigned, then the quantity cannot be received.

LOCATION

A location is a physical structure or place where inventory is received, stored, and shipped, potentially organized in bins. A location can be a warehouse, service car, showroom, plant, or an area in a plant.

FIRST EXPIRED FIRST OUT

If you select the **Pick According to FEFO** check box on the **Bin Policies** FastTab on the location card, then item-tracked items are picked according to their expiration date. The items with the earliest expiration dates are picked first.

Warehouse activities in all pick and movement documents are sorted according to FEFO, unless the items in question already have serial/lot numbers assigned. If only a part of the quantity on the line already has serial/lot numbers assigned, then the remaining quantity to be picked is sorted according to FEFO.

When picking by FEFO, the available items that expire first are gathered in a temporary item tracking list based on the expiration date. If two items have the same expiration date, then the item with the lowest lot or serial number is picked first. If the lot or serial numbers are the same, then the item that was registered first is selected first. Standard criteria for selecting items in pick bins, such as Bin Ranking and Break Bulk, are applied to this temporary FEFO item tracking list.

PUT-AWAY TEMPLATE

The put-away template can be assigned to an item and to a location. The put-away template specifies a set of prioritized rules that must be respected when creating put-aways. For example, a put-away template may require that the item is placed in a bin with bin content that matches the UOM, and if a similar bin with enough capacity cannot be found, then the item must be placed in an empty bin.

SEE ALSO

Warehouse Management

Availability in the Warehouse

INBOUND WAREHOUSE FLOW

The inbound flow in a warehouse begins when items arrive in the warehouse of the company location, either received from external sources or from another company location. An employee registers the items, typically by scanning a bar code. From the receiving dock, warehouse activities are performed at different complexity levels to bring the items into the storage area.

Each item is identified and matched to a corresponding inbound source document. The following inbound source documents exist:

- Purchase order
- Inbound transfer order
- Sales return order

In addition, the following internal source documents exist that function like inbound sources:

1. Production order with output posting

2. Assembly order with output posting

The last two represent inbound flows to the warehouse from internal operation areas. For more information about warehouse handling for internal inbound and outbound processes, see Internal Warehouse Flows.

Processes and UI documents in inbound warehouse flows are different for basic and advanced warehousing. The main difference is that activities are performed order-by-order in basic warehousing, and they are consolidated for multiple orders in advanced warehousing. For more information about different warehouse complexity levels, see Warehouse Overview and Warehouse Setup.

In Microsoft Dynamics NAV, the inbound processes of receiving and putting away can be performed in four ways using different functionalities depending on the warehouse complexity level.

Method	Inbound process	Bins	Receipts	Put-aways	Complexity level (See Warehouse Setup)
A	Post receipt and put-away from the order line	X			2
B	Post receipt and put-away from an inventory put-away document			X	3
C	Post receipt and put-away from a warehouse receipt document		X		4/5/6
D	Post receipt from a warehouse receipt document and post put-away from a warehouse put-away document		X	X	4/5/6

Selecting an approach depends on the company's accepted practices and the level of their organizational complexity. In an order-by-order warehouse environment, where most of the warehouse staff works directly with order documents, a company might decide to use method A. An order-by-order warehouse that has a more complex put-away process, or where there are dedicated warehouse staff to perform warehousing functions, might decide to separate their put-away functions from the order document, method B. Additionally, companies that need to plan the handling of multiple orders may find it helpful to use warehouse receipt documents, methods C and D.

In methods A, B, and C, the actions of receiving and putting away are combined in one step when posting the corresponding documents as received. In method D, the receipt is posted first to recognize the increase of inventory and that items are available for sale. The warehouse worker then registers the put-away to make items available to pick.

BASIC WAREHOUSING

The following diagram illustrates the inbound warehouse flows by document type in basic warehousing. The numbers in the diagram correspond with the steps in the sections following the diagram.
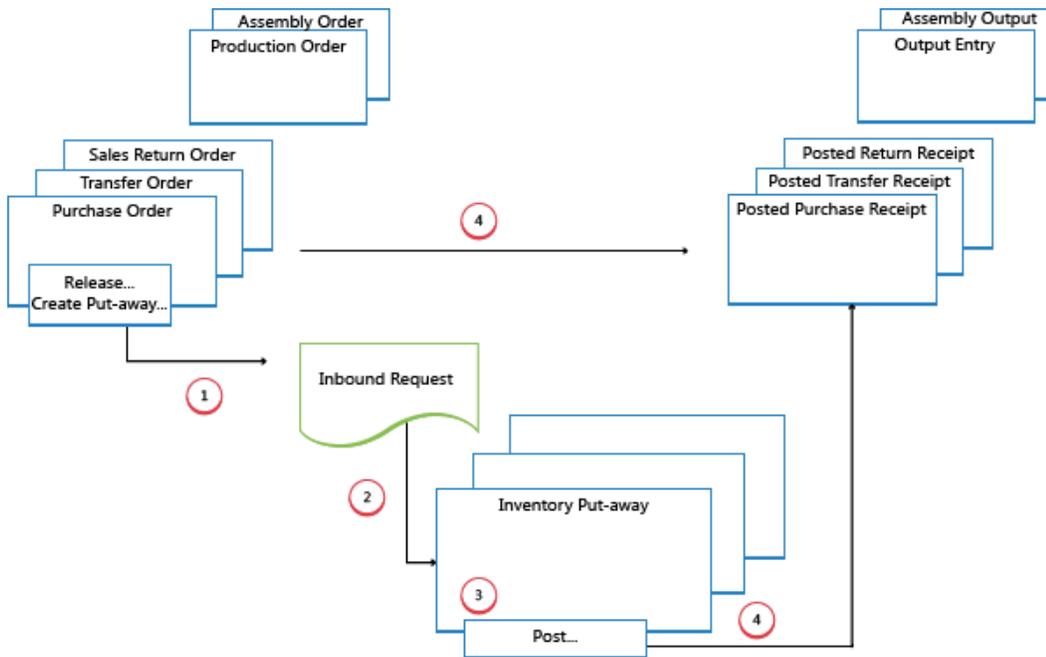
1: RELEASE SOURCE DOCUMENT / CREATE INVENTORY PUT-AWAY

When items are received in the warehouse, the user who is responsible for receiving releases the source document, such as a purchase order or an inbound transfer order, to signal to warehouse workers that the received items can be put away in inventory. Alternatively, the user creates inventory put-away documents for individual order lines, in a push fashion, based on specified bins and quantities to handle.

2: CREATE INBOUND REQUEST

When the inbound source document is released, an inbound warehouse request is created automatically. It contains references to the source document type and number and is not visible to the user.

3: CREATE INVENTORY PUT-AWAY

In the **Inventory Put-away** window, the warehouse worker retrieves, in a pull fashion, the pending source document lines based on inbound warehouse requests. Alternatively, the inventory put-away lines are already created, in a push fashion, by the user who is responsible for the source document.

4: POST INVENTORY PUT-AWAY

On each line for items that have been put away, partially or fully, the warehouse worker fills in the **Quantity** field, and then posts the inventory put-away. Source documents that are related to the inventory put-away are posted as received.

Positive item ledger entries are created, warehouse entries are created, and the put-away request is deleted, if fully handled. For example, the **Quantity Received** field on the inbound source document line is updated. A posted receipt document is created that reflects the purchase order, for example, and the received items.

ADVANCED WAREHOUSING

The following diagram illustrates the inbound warehouse flow by document type in advanced warehousing. The numbers in the diagram correspond with the steps in the sections following the diagram.

1: RELEASE SOURCE DOCUMENT

When items are received in the warehouse, the user who is responsible for receiving releases the source document, such as a purchase order or an inbound transfer order, to signal to warehouse workers that the received items can be put away in inventory.

2: CREATE INBOUND REQUEST

When the inbound source document is released, an inbound warehouse request is created automatically. It contains references to the source document type and number and is not visible to the user.

3: CREATE WAREHOUSE RECEIPT

In the **Warehouse Receipt** window, the user who is responsible for receiving items retrieves the pending source document lines based on the inbound warehouse request. Several source document lines can be combined in one warehouse receipt document.

The user fills in the **Qty. to Handle** field and selects the receiving zone and bin, if required.

4: POST WAREHOUSE RECEIPT

The user posts the warehouse receipt. Positive item ledger entries are created. For example, the **Quantity Received** field on the inbound source document line is updated.

5: CREATE WAREHOUSE INTERNAL PUT-AWAY

The user who is responsible for putting away from internal operations creates a warehouse internal put-away for items that have to be put away in the warehouse, such as production or assembly output. The user specifies quantity, zone, and bin from where the items should be put away, potentially with the **Get Bin Content** function. The user releases the warehouse internal put-away, which creates an inbound warehouse request so that the task can be retrieved in warehouse put-away documents or in the put-away worksheet.

6: CREATE PUT-AWAY REQUEST

When the inbound source document is posted, a warehouse put-away request is created automatically. It contains references to the source document type and number and is not visible to the user. Depending on the setup, output from a production order also creates a put-away request to put the finished items away in inventory.

7: GENERATE PUT-AWAY WORKSHEET LINES (OPTIONAL)

The user who is responsible for coordinating put-aways retrieves warehouse put-away lines in the **Put-away Worksheet** based on posted warehouse receipts or internal operations with output. The user selects the lines to be put-away and prepares the put-aways by specifying which bins to take from, which bins to place in, and how many units to handle. The bins may be predefined by the setup of the warehouse location or operation resource.

When all put-aways are planned and assigned to warehouse workers, the user generates the warehouse put-away documents. Fully assigned put-aways lines are deleted from the **Put-away Worksheet**.

📝 Note

If the **Use Put-away Worksheet** field is not selected on the location card, then warehouse put-away documents are created directly based on posted warehouse receipts. In that case, step 7 is omitted.

8: CREATE WAREHOUSE PUT-AWAY DOCUMENT

The warehouse worker who performs put-aways creates a warehouse put-away document in a pull fashion, based on the posted warehouse receipt. Alternatively, the warehouse put-away document is created and assigned to a warehouse worker in a push fashion.

9: REGISTER WAREHOUSE PUT-AWAY

On each line for items that have been put away, partially or fully, the warehouse worker fills in the **Quantity** field in the **Warehouse Put-away** window, and then registers the warehouse put-away.

Warehouse entries are created, and the warehouse put-away lines are deleted, if fully handled. The warehouse put-away document remains open until the full quantity of the related posted warehouse receipt is registered. The **Qty. Put Away** field on the warehouse receipt order lines is updated.

SEE ALSO

Warehouse Management

INTERNAL WAREHOUSE FLOWS

The flow of items between bins at a company location centers on picking components and putting away end items for assembly or production orders and ad-hoc movements, such as bin replenishments, without a relation to source documents. The scope and nature of the involved activities vary between basic and advanced warehousing.

Some internal flows overlap with inbound or outbound flows. Some of this overlap is shown as steps 4 and 5 in the graphical diagrams for advanced inbound and outbound flows respectively. For more information, see Inbound Warehouse Flow and Outbound Warehouse Flow.

INTERNAL FLOWS IN BASIC WAREHOUSING

In basic warehouse configuration, the flow of items between bins inside the company centers on picking component and putting away end items for production or assembly orders and ad-hoc movements, such as bin replenishments, without relation to source documents.

FLOWS TO AND FROM PRODUCTION

The main integration between production orders and basic warehouse activities is represented by the ability to pick production components with the **Inventory Pick** or the **Inventory Movement** windows.

 Note
In the **Inventory Pick** window, the component consumption is posted together with the pick posting. By using the **Inventory Movement** window, only bin adjustments are registered, no item ledger posting occurs.

In addition to component handling, the integration is represented by the ability to put produced items away with the **Inventory Put-away** window.

The **To-Production Bin Code**, **From-Production Bin Code**, and **Open Shop Floor Bin Code** fields on the location card or the machine/work center cards define default flows to and from production areas.

For more information about how component consumption is flushed from the To-Production or Open Shop Floor bins, see the "Flushing Production Components in the Warehouse" section in this topic.

FLOWS TO AND FROM ASSEMBLY

The main integration between assembly orders and basic warehouse activities is represented by the ability to move assembly components to the assembly area.

While no specific warehouse functionality exists for putting assembly items away, the bin code on the assembly order header may be set to a default put-away bin. Posting the assembly order then functions like posting a put-away. The warehouse activity to move assembly items into the warehouse can be managed in the **Internal Movement** window, with no relation to the assembly order.

The following assembly flows exist.

Flow	Description
Assemble-to-stock	The components are needed on an assembly order where the output is stored in the warehouse.
	This warehouse flow is managed in the **Inventory Movement** window. One take line specifies where to take the components. One place line specifies where to place the components.
Assemble-to-order	The components are needed on an assembly order that is linked to a sales order that is shipped when the sold item is assembled.

 Note
If items are assembled to order, then the inventory pick of the linked sales order triggers an inventory movement for all the involved assembly components, not just for the sold item as when shipping inventory items.

The **To-Assembly Bin Code**, **From-Assembly Bin Code**, and **Asm.-to-Order Shpt. Bin Code** fields on the location card define default flows to and from assembly areas.

📝 Note

The **Asm.-to-Order Shpt. Bin Code** field functions as the from-assembly bin in assemble-to-order scenarios.

AD-HOC MOVEMENTS

In basic warehousing, the movement of items from bin to bin without relation to source documents is performed in the **Internal Movement** window, which functions together with the **Inventory Movement** window.

Another way to move items ad hoc between bins is to post positive entries in the **New Bin Code** field in the **Item Reclass. Journal** window.

INTERNAL FLOWS IN ADVANCED WAREHOUSING

In advanced warehouse configurations, the flow of items between bins inside the company centers on picking component and putting away end items for production orders and picking components for assembly orders. In addition, internal flows occur as ad-hoc movements, such as bin replenishments, without relation to source documents.

FLOWS TO AND FROM PRODUCTION

The main integration between production orders and advanced warehouse activities is represented by the ability to pick production components, in the **Warehouse Pick** window and the **Pick Worksheet** window, and the ability to put produced items away with the **Whse. Internal-Put-away** window.

Another integration point in production is provided with the **Warehouse Movement** window, together with the **Movement Worksheet** window, which enables you to place components and take produced items for released production orders.

The **To-Production Bin Code**, **From-Production Bin Code**, and **Open Shop Floor Bin Code** fields on the location card or the machine/work center cards define default flows to and from production areas.

For more information about how component consumption is flushed from the To-Production or Open Shop Floor Bins, see the "Flushing Production Components in the Warehouse" section in this topic.

FLOWS TO AND FROM ASSEMBLY

The main integration between assembly orders and advanced warehouse activities is represented by the ability to pick assembly components, both with the **Warehouse Pick** window and the **Pick Worksheet** window. This functionality works just like when picking components for production orders.

While no specific warehouse functionality exists for putting assembly items away, the bin code on the assembly order header may be set to a default put-away bin. Posting the assembly order then functions like posting a put-away. The warehouse activity to move assembly items into the warehouse can be managed in the **Movement Worksheet** window or the **Whse. Internal Put-away** window, with no relation to the assembly order.

📝 Note

If items are assembled to order, then the warehouse shipment of the linked sales order triggers a warehouse pick for all the involved assembly components, not just for the sold item as when shipping inventory items.

The **To-Assembly Bin Code** and **From-Assembly Bin Code** fields on the location card define default flows to and from assembly areas.

AD-HOC MOVEMENTS

In advanced warehousing, the movement of items from bin to bin without relation to source documents is managed in the **Movement Worksheet** window and registered in the **Warehouse Movement** window.

FLUSHING PRODUCTION COMPONENTS IN THE WAREHOUSE

If set up on the item card, components picked with warehouse picks are posted as consumed by the production order when the warehouse pick is registered. By using the **Pick + Forward** method and the **Pick + Backward** flushing method, the pick registration triggers the related consumption posting when the first operation starts or when the last operation finishes, respectively.

Consider the following scenario based on the CRONUS International Ltd. demonstration database, WHITE location.

A production order for 15 PCS of item LS-100 exists. Some of the items on the component list must be flushed manually in a consumption journal, and other items on the list can be picked and flushed automatically using the **Pick + Backward** flushing method.

📝 **Note**

    Pick + Forward only works if the second production routing line operation uses a routing link code. Releasing a planned production order initiates forward flushing of components set to **Pick + Forward**. However, the flushing cannot take place until the pick of the components is registered, which again can only take place when the order is released.

The following steps describe the involved actions by different users and the related response:

1. The shop floor supervisor releases the production order. Items with **Forward** flushing method and no routing link code are deducted from the open shop floor bin.

2. The shop floor supervisor chooses the **Create Warehouse Pick** button on the production order. A warehouse pick document is created pick for items with **Manual**, **Pick + Backward**, and **Pick + Forward** flushing methods. These items are placed in the To-Production bin.

3. The warehouse manager assigns the picks to a warehouse worker.

4. The warehouse worker picks the items from appropriate bins and places them in the To-Production bin or in the bin specified on the warehouse pick, which may be a work center or machine center bin).

5. The warehouse worker registers the pick. The quantity is subtracted from the pick bins and added to the consumption bin. The **Qty. Picked** field on the component list for all picked items is updated.

   📝 **Note**

       Only the quantity that is picked can be consumed.

6. The machine operator informs the production manager that the end items are finished.

7. The shop floor supervisor uses the consumption journal or production journal to post the consumption of component items that use either **Manual** flushing method or **Forward** or **Pick + Forward** flushing methods together with routing link codes.

8. The production manager posts the output of the production order and changes status to **Finished**. The quantity of component items that use **Backward** flushing method is deducted from the open shop floor bin, and the quantity of component items that use **Pick + Backward** flushing method is deducted from the To-Production bin.

The following illustration shows when the **Bin Code** field on the component list is filled according to your location or machine/work center setup.
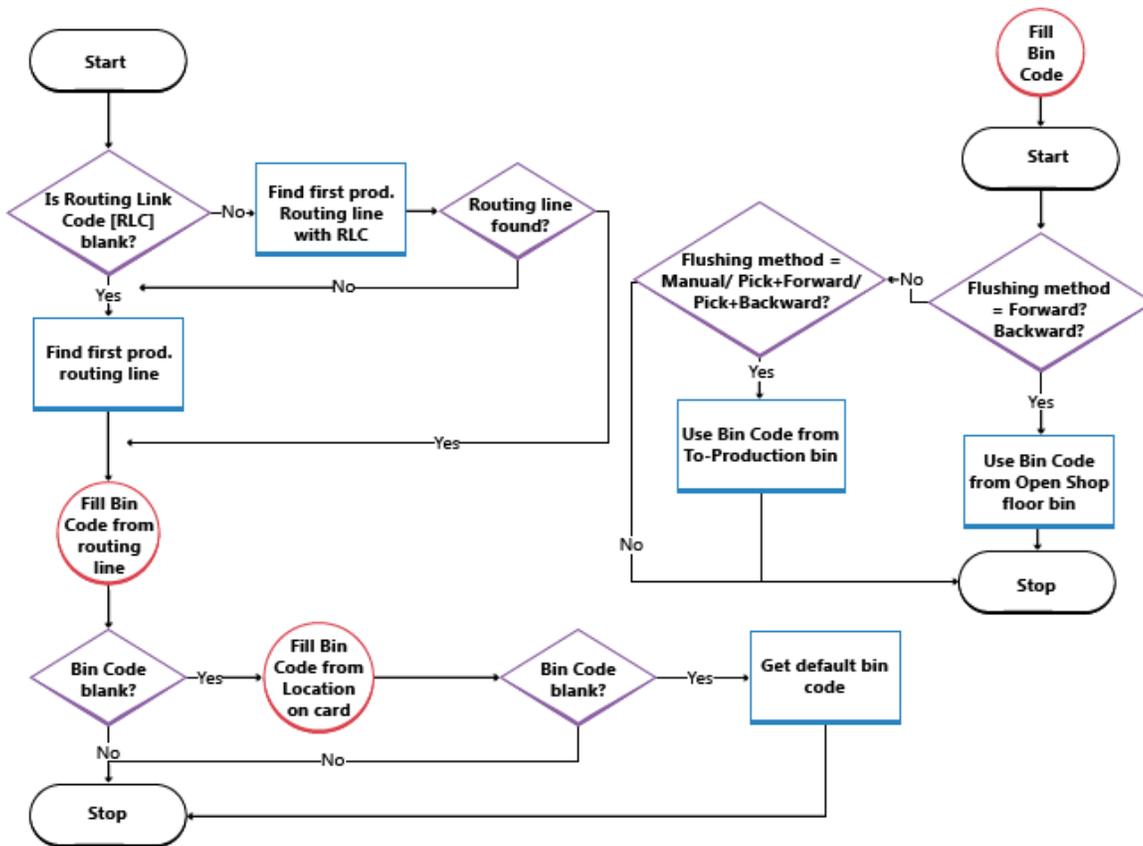
SEE ALSO
Warehouse Management

AVAILABILITY IN THE WAREHOUSE

The system must keep a constant control of item availability in the warehouse, so that outbound orders can flow efficiently and provide optimal deliveries.

Availability varies depending on allocations at the bin level when warehouse activities such as picks and movements occur and when the inventory reservation system imposes restrictions to comply with. A rather complex algorithm verifies that all conditions are met before allocating quantities to picks for outbound flows.

BIN CONTENT AND RESERVATIONS

In any installation of NAV warehouse management, item quantities exist both as warehouse entries, in the Warehouse application area, and as item ledger entries, in the Inventory application area. These two entry types contain different information about where items exist and whether they are available. Warehouse entries define an item's availability by bin and bin type, which is called bin content. Item ledger entries define an item's availability by its reservation to outbound documents.

Special functionality in the picking algorithm exists to calculate the quantity that is available to pick when bin content is coupled with reservations.

QUANTITY AVAILABLE TO PICK

If, for example, the picking algorithm does not consider item quantities that are reserved for a pending sales order shipment, then those items might be picked for another sales order that is shipped earlier, which prevents the first sales from being fulfilled. To avoid this situation, the picking algorithm subtracts quantities that are reserved for other outbound documents, quantities on existing pick documents, and quantities that are picked but not yet shipped or consumed.

The result is displayed in the **Available Qty. to Pick** field in the **Pick Worksheet** window, where the field is calculated dynamically. The value is also calculated when users create warehouse picks directly for outbound documents. Such outbound documents could be sales orders, production consumption, or outbound transfers, where the result is reflected in the related quantity fields, such as **Qty. to Handle**.

📝 **Note**

Concerning the priority of reservations, the quantity to reserve is subtracted from the quantity available to pick. For example, if the quantity available in pick bins is 5 units, but 100 units are in put-away bins, then when you try to reserve more than 5 units for another order, an error message is displayed because the additional quantity must be available in pick bins.

CALCULATING THE QUANTITY AVAILABLE TO PICK

The quantity available to pick is calculated as follows:

quantity available to pick = quantity in pick bins - quantity on picks and movements – (reserved quantity in pick bins + reserved quantity on picks and movements)

The following diagram shows the different elements of the calculation.

Total quantity in the warehouse
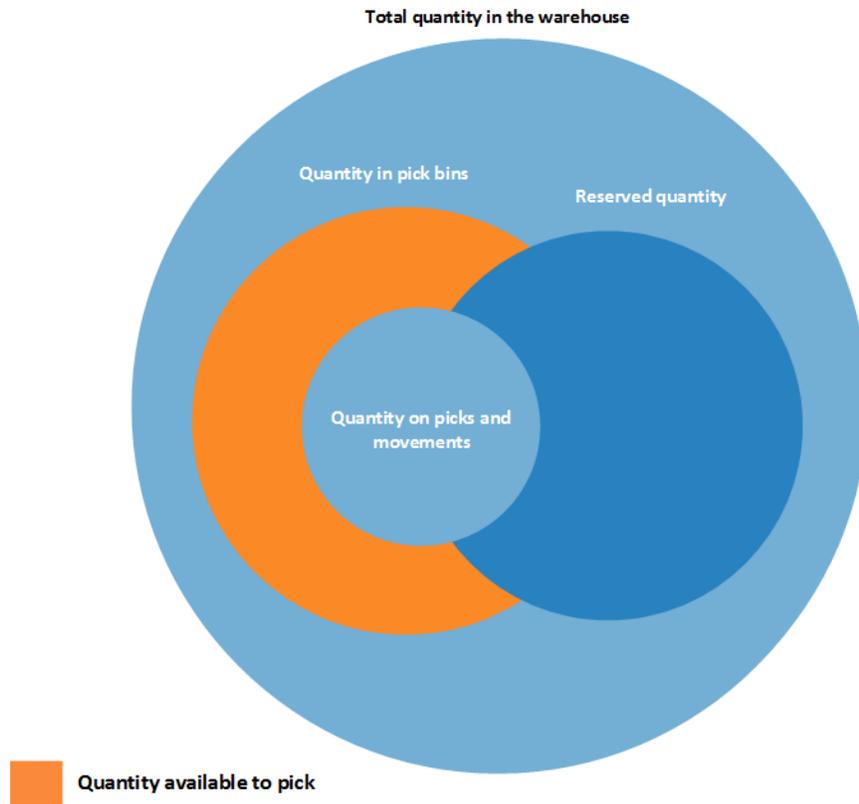
QUANTITY AVAILABLE TO RESERVE

Because the concepts of bin content and reservation co-exist, the quantity of items that are available to reserve must be aligned with allocations to outbound warehouse documents.

It should be possible to reserve all items in inventory, except those that have started outbound processing. Accordingly, the quantity that is available to reserve is defined as the quantity on all documents and all bin types, except the following outbound quantities:

- Quantity on unregistered pick documents
- Quantity in shipment bins
- Quantity in to-production bins
- Quantity in open shop floor bins
- Quantity in to-assembly bins
- Quantity in adjustment bins

The result is displayed in the **Total Available Quantity** field in the **Reservation** window.

On a reservation line, the quantity that cannot be reserved, because it is allocated in the warehouse, is displayed in the **Qty. Allocated in Warehouse** field in the **Reservation** window.

CALCULATING THE QUANTITY AVAILABLE TO RESERVE

The quantity available to reserve is calculated as follows:

quantity available to reserve = total quantity in inventory - quantity on picks and movements for source documents - reserved quantity - quantity in outbound bins

The following diagram shows the different elements of the calculation.
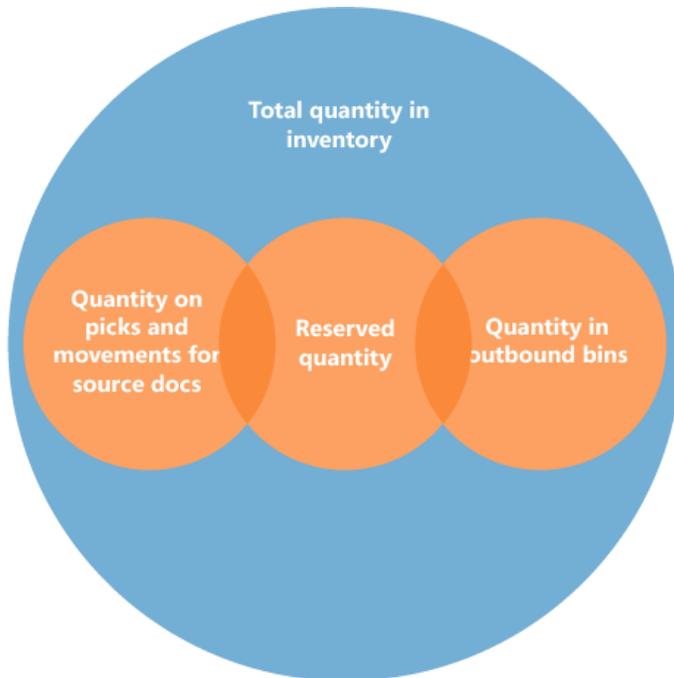
SEE ALSO

Warehouse Management

OUTBOUND WAREHOUSE FLOW

The outbound flow in the warehouse begins with a request from released source documents to bring the items out of the warehouse location, either to be shipped to an external party or to another company location. From the storage area, warehouse activities are performed at different complexity levels to bring the items out to the shipping docks.

Each item is identified and matched to a corresponding inbound source document. The following outbound source documents exist:
- Sales order
- Outbound transfer order
- Purchase return order
- Service order

In addition, the following internal source documents exist that function like outbound sources:

1. Production order with component need

2. Assembly order with component need

The last two documents represent outbound flows from the warehouse to internal operation areas. For more information about warehouse handling for internal inbound and outbound processes, see Internal Warehouse Flows.

Processes and UI documents in outbound warehouse flows are different for basic and advanced warehousing. The main difference is that activities are performed order-by-order in basic warehousing, and they are consolidated for multiple orders in advanced warehousing. For more information about different warehouse complexity levels, see Warehouse Overview and Warehouse Setup.

In Microsoft Dynamics NAV, the outbound processes of picking and shipping can be performed in four ways using different functionalities depending on the warehouse complexity level.

| Method	Inbound process	Bins	Picks	Shipments	Complexity level (See Warehouse Setup)
A	Post pick and shipment from the order line	X			2
B	Post pick and shipment from an inventory pick document		X		3
C	Post pick and shipment from a warehouse shipment document			X	4/5/6
D	Post pick from a warehouse pick document and post shipment from a warehouse shipment document		X	X	4/5/6

For more information, see Outbound Warehouse Flow.

Selecting an approach depends on the company's accepted practices and the level of their organizational complexity. In an order-by-order environment with straightforward processes and simple bin structure, method A, picking and shipping from the order line is appropriate. In other order-by-order companies where items for one order line might come from more than one bin or where warehouse workers cannot work with order documents, the use of separate pick documents is appropriate, method B. Where a company's picking and shipping processes involve multiple order handling and therefore require greater control and overview, the company might choose to use a warehouse shipment document and warehouse pick document to separate the picking and shipping tasks, methods C and D.

In methods A, B, and C, the actions of picking and shipping are combined in one step when posting the corresponding document as shipped. In method D, the pick is first registered, and then the shipment is posted at a later time from a different document.

BASIC WAREHOUSING

The following diagram illustrates the outbound warehouse flows by document type in basic warehousing. The numbers in the diagram correspond with the steps in the sections following the diagram.
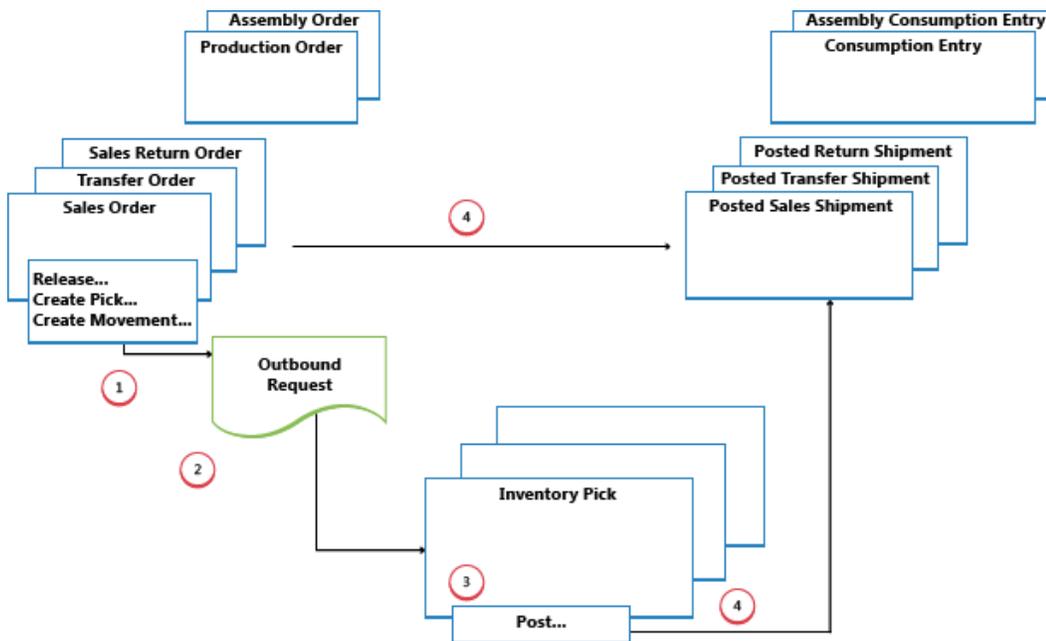
1: RELEASE SOURCE DOCUMENT / CREATE INVENTORY PICK OR MOVEMENT

When a user who is responsible for source documents, such as a sales order processor or production planner, is ready for the outbound warehouse activity, he or she releases the source document to signal to warehouse workers that sold items or components can be picked and placed in the specified bins. Alternatively, the user creates inventory pick or movement documents for the individual order lines, in a push fashion, based on specified bins and quantities to handle.

📝 **Note**

Inventory movements are used to move items to internal operation areas in basic warehousing, based on source documents or on an ad hoc basis.

2: CREATE OUTBOUND REQUEST

When the outbound source document is released, an outbound warehouse request is created automatically. It contains references to the source document type and number and is not visible to the user.

3: CREATE INVENTORY PICK OR MOVEMENT

In the **Inventory Pick** or **Inventory Movement** window, the warehouse worker retrieves, in a pull fashion, the pending source document lines based on outbound warehouse requests. Alternatively, the inventory pick lines are already created, in a push fashion, by the user who is responsible for the source document.

4: POST INVENTORY PICK OR REGISTER INVENTORY MOVEMENT

On each line for items that have been picked or moved, partially or fully, the warehouse worker fills in the **Quantity** field, and then posts the inventory pick or registers the inventory movement. Source documents related to the inventory pick are posted as shipped or consumed. Source documents related to inventory movements are not posted.

For inventory picks, negative item ledger entries are created, warehouse entries are created, and the pick request is deleted, if fully handled. For example, the **Quantity Shipped** field on the outbound source document line is updated. A posted shipment document is created that reflects the sales order, for example, and the shipped items.

ADVANCED WAREHOUSING

The following diagram illustrates the outbound warehouse flow by document type in advanced warehousing. The numbers in the diagram correspond with the steps in the sections following the diagram.
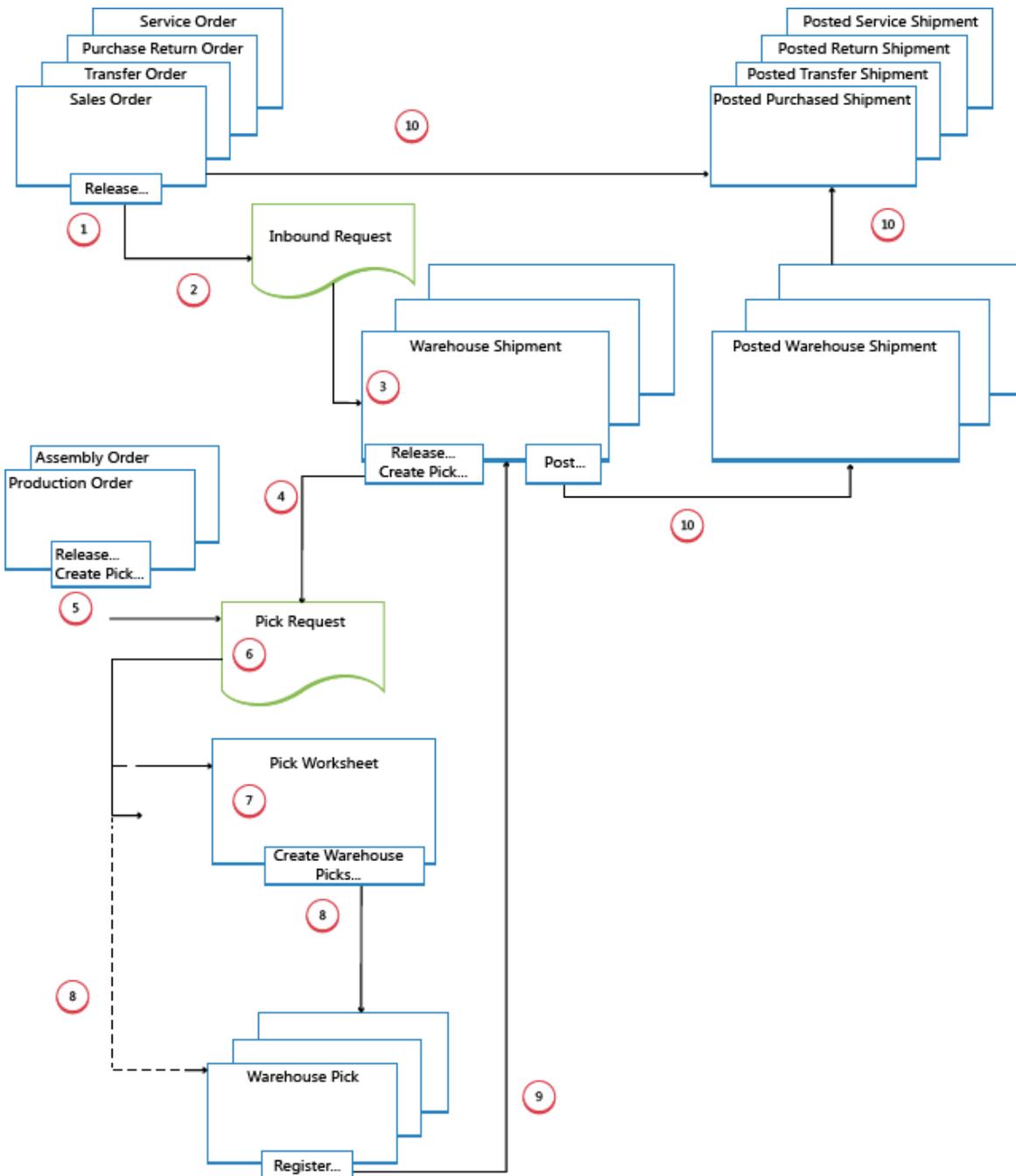
1: RELEASE SOURCE DOCUMENT

When a user who is responsible for source documents, such as a sales order processor or production planner, is ready for the outbound warehouse activity, he or she releases the source document to signal to warehouse workers that sold items or components can be picked and placed in the specified bins.

2: CREATE OUTBOUND REQUEST

When the inbound source document is released, an outbound warehouse request is created automatically. It contains references to the source document type and number and is not visible to the user.

3: CREATE WAREHOUSE SHIPMENT

In the **Warehouse Shipment** window, the shipping worker who is responsible retrieves pending source document lines based on the outbound warehouse request. Several source document lines can be combined in one warehouse shipment document.

4: RELEASE SHIPMENT / CREATE WAREHOUSE PICK

The shipping worker who is responsible releases the warehouse shipment, so that warehouse workers can create or coordinate warehouse picks for the shipment in question.

Alternatively, the user creates warehouse pick document for individual shipment lines, in a push fashion, based on specified bins and quantities to handle.

5: RELEASE INTERNAL OPERATION / CREATE WAREHOUSE PICK

The user who is responsible for internal operations releases an internal source document, such as a production and assembly order, so that warehouse workers can create or coordinate warehouse picks for the internal operation in question.

Alternatively, the user creates warehouse pick documents for the individual production or assembly order, in a push fashion, based on specified bins and quantities to handle.

6: CREATE PICK REQUEST

When the outbound source document is released, a warehouse pick request is created automatically. It contains references to the source document type and number and is not visible to the user. Depending on the setup, consumption from a production and assembly order also creates a pick request to pick the needed components from inventory.

7: GENERATE PICK WORKSHEET LINES

The user who is responsible for coordinating picks, retrieves warehouse pick lines in the **Pick Worksheet** based on pick requests from warehouse shipments or internal operations with component consumption. The user selects the lines to be picked and prepares the picks by specifying which bins to take from, which bins to place in, and how many units to handle. The bins may be predefined by setup of the warehouse location or operation resource.

The user specifies picking methods for optimized warehouse handling and then uses a function to create the corresponding warehouse pick documents, which are assigned to different warehouse workers who perform warehouse picks. When the warehouse picks are fully assigned, the lines in the **Pick Worksheet** are deleted.

8: CREATE WAREHOUSE PICK DOCUMENTS

The warehouse worker who perform picks create a warehouse pick document, in a pull fashion, based on the released source document. Alternatively, the warehouse pick document is created and assigned to the warehouse worker in a push fashion.

9: REGISTER WAREHOUSE PICK

On each line for items that have been picked, partially or fully, the warehouse worker fills in the **Quantity** field in the **Warehouse Pick** window and then registers the warehouse pick.

Warehouse entries are created, and the warehouse pick lines are deleted, if fully handled. The warehouse pick document remains open until the full quantity of the related warehouse shipment is registered. The **Qty. Picked** field on the warehouse shipment lines is updated accordingly.

10: POST WAREHOUSE SHIPMENT

When all items on the warehouse shipment document are registered as picked to the specified shipment bins, the shipping worker who is responsible posts the warehouse shipment. Negative item ledger entries are created. For example, the **Quantity Shipped** field on the outbound source document line is updated.

SEE ALSO

Warehouse Management

INTEGRATION WITH INVENTORY

The Warehouse Management application area and the Inventory application area interact with one another in physical inventory and in inventory or warehouse adjustment.

PHYSICAL INVENTORY

The **Whse. Phys. Inventory Journal** window is used with the **Phys. Inventory Journal** window for all advanced warehouse locations. The inventory on bin level is calculated, and a printed list is provided for the warehouse employee. The list shows which items in which bins must be counted.

The warehouse employee enters the counted quantity in the **Whse. Phys. Inventory Journal** window and then posts the journal.

If the counted quantity is greater than the quantity on the journal line, a movement is posted for this difference from the default adjustment bin to the counted bin. This increases the quantity in the counted bin and decreases the quantity in the default adjustment bin.

If the quantity counted is less than the quantity on the journal line, a movement for this difference is posted from the counted bin to the default adjustment bin. This decreases the quantity in the counted bin and increases the quantity in the default adjustment bin.

In advanced warehousing, the value in the **Quantity (Calculated)** field is retrieved from item ledger entries and the value in the **Quantity (Phys. Inventory)** field is retrieved from warehouse entries, excluding the adjustment bin content. The **Quantity** field specifies the difference between the first two fields, which should be equal to the contents of the adjustment bin.

When you post the physical inventory journal, the inventory and the default adjustment bin are updated.

WAREHOUSE ADJUSTMENTS TO THE ITEM LEDGER

You use the **Item Journal** window and the **Calculate Whse. Adjustment** function to adjust inventory on the item ledger in accordance with an adjustment that has been made to the item quantity in a warehouse bin. To create a link between the inventory and the warehouse, you must define a default adjustment bin per location.

The default adjustment bin registers items in the warehouse when you post an increase for the inventory. However, if you post a decrease, the quantity on the default bin is also decreased. In both cases, item ledger entries and warehouse entries are created.

Note
The adjustment bin is not included in the availability calculation.

If you want to adjust the bin content, you can use the warehouse item journal, from which you can enter the item number, zone code, bin code, and quantity that you want to adjust.

If you enter a positive quantity and post the line, then the inventory stored in the bin increases, and the quantity of the default adjustment bin decreases correspondingly.

SEE ALSO

Warehouse Management

Availability in the Warehouse

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